Water Quality Protection Toolkit

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Water is vital for all of us. We depend on its good quality and quantity for drinking, recreation, use in industry and growing crops. It is also vital to sustaining the natural systems on and under the earth's surface. Ground water is a hidden resource. Its purity and availability were taken for granted. Now contamination and availability are serious issues. Runoff from streets, farms, mines, yards, and parking lots are some of the most threatening sources of contamination to our drinking water. They are also known as nonpoint pollution sources and are very hard to control because (as their name states) this pollution does not come from a single point but pollutes as a strong collective contaminant. The best way to protect our surface and ground water from this nonpoint pollution is by "collectively" managing the sources of pollution by using a regional watershed approach. A watershed is simply an area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake, or groundwater. Managing the watershed as a whole is the only way to mitigate nonpoint pollution.

One of the setbacks encountered when compiling this packet was the lack of information on the conditions of Stark County's watersheds. Stark County has six different watersheds and substantial information on only three of the watersheds was found. Given that situation, the Nimishillen Creek Watershed was used as a model because its spans most of the different geographical and economical regions of our county. Following this document is a map showing the watersheds found in Stark County (2 MB).

The Nimishillen Creek Watershed lies almost entirely in Stark County. This watershed has been recently gaining more attention than other watersheds in Stark County and a Nimishillen Creek Watershed Management Plan is currently being reviewed. However, the Nimishillen Creek Watershed is still in the process of being fully assessed. Of the assessed areas, only 18% of the sites are in full attainment (all three indices meeting ecoregion standards) with the EPA, 45% are in partial attainment (one or two indices meeting ecoregion standards) and 37% of the sites were in nonattainment (none of the indices meeting ecoregion standards) (NEFCO 2006). There are many nonpoint sources of pollution in Stark County that are contributing to the Nimishillen Creek Watershed's lack of attainment with the EPA's standards.

By using the Nimishillen Creek Watershed as a model, it was determined what sources of nonpoint pollution generated the greatest impact on the watersheds of Stark County. The toolkit is divided into five sections. The first four sections address current sources of pollution: storm water runoff and flooding, agricultural runoff, failing home sewage treatment systems and acid mine drainage. The last section addresses how to prevent future sources of pollution. In each section, possible solutions are suggested along with information regarding funding sources and implementation for each solution.

Water Quality Issue: Storm Water Runoff and Flooding

One of leading sources of the pollution in our watershed is storm water runoff. In this section we will be discussing storm water discharges generated by runoff from urban and suburban areas. Agricultural runoff will be discussed in a different section. As rain or melting snow run across impervious areas such as paved roads, parking lots, and rooftops, it carries the substances it comes in contact with straight to the watershed unless properly treated. Storm water runoff often contains pollutants such as pesticides, fertilizers, oils, salts, litter, sediment, and other debris.

Another problem associated with storm water runoff is flooding. Some factors that contribute to the increased chance of flooding include an increased amount of people living in or near the flood plain, an increase in the amount of impervious areas, removing riparian (stream bank) vegetation, reducing the amount of wetlands, filling in floodplains, and altering streams. Stark County has recently felt the severity of these effects in the flooding events of the summer and fall of 2003.

Suggested Solution #1: Implement the National Pollutant Discharge Elimination System (NPDES) Phase II

The NPDES program is a permit program regulated by the Environmental Protection Agency. Phase I of the program dealt with regulating the storm water discharge from "medium" and "large" municipal separate storm sewer systems which generally serve populations of 100,000 or greater, construction sites of 5 acres of land or greater, and various categories of discharges from industrial sites (Stark County Consortium 2003). Phase II of the USEPA's NPDES program deals with "small" municipal separate storm sewers (serving populations of 100,000 or less) and small construction sites that disturb one acre of land. In order to comply with these permits, each municipality must implement Best Management Practices outlined by the Ohio Environmental Protection Agency. The six minimum measures each region must practice are:

1. Public Education and Outreach on Storm Water Impacts
2. Public Involvement/Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Storm Water Runoff Control
5. Post-Construction Storm Water Management in New Development and redevelopment
6. Pollution Prevention/Good Housekeeping for Municipal Operations

Specific guidelines given by the Ohio EPA can be found at
http://www.epa.state.oh.us/dsw/storm/index.html

Suggested Solution #2: Implement Storm Water Best Management Practices

When handling the pollution caused by storm water runoff, prevention should be the focus. It is far more expensive to try to remove pollutants from a body of water that has been contaminated than to spend money on preventative operations (EPA 2006). The most effective way to manage storm water runoff is to practice a holistic approach. Individual efforts are often not very effective alone, however, in a large group such efforts are key in a storm water management system. The EPA has established best management practices that directly compliment each of the six measures all regions should follow in compliance with the NPDES Phase II plan. The EPA website: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm gives a detailed description of each best management practice including where to get supplies and funding. They also mention many case studies of other regions' storm water management strategies. A brief outline of the EPA's Best Management Practices for each minimum measure is listed below.

1. **Educate the public** about storm water runoff:
   - developing municipal outreach programs
   - classroom education on storm water
   - storm water outreach for commercial businesses
   - tailoring outreach programs to minority & disadvantaged communities

- using the media
- and educating the homeowner (proper disposal of hazardous waste, pest control, pet waste control, etc.)

2. **Involve the public** with their participation in the storm water management system:
   - Adopt-A-Stream programs
   - storm drain stenciling
   - reforestation programs
   - stream clean-up and monitoring programs
   - volunteer monitoring
   - wetland planting
   - soliciting public opinion (conduct attitude surveys, stakeholders meetings, watershed organizations)
3. **Illicit discharge detection and elimination**:
   - developing an illicit discharge detection and elimination program
   - reducing the occurrence of sanitary sewer overflows
   - developing a used oil recycling program
   - illegal dumping control
   - trash management
   - preventing septic system failure
   - controlling sewage from recreational areas
   - encouraging public reporting through hotlines
4. **Control construction site storm water runoff**:
   - having a municipal program oversight (construction phase plan review, contractor training and certification, local ordinances for construction site runoff control, municipal construction inspection program)
   - establishing construction site planning and managing (construction sequencing, having construction site operator BMP inspection and maintenance, land grading, preserving natural vegetation)
   - erosion control (chemical stabilization, composite blankets, dust control, geotextiles, gradient terraces, mulching, riprap, sodding, seeding, soil retention, soil roughing, temporary slope drain, temporary stream crossing, wind fences and sand fences)
   - runoff control (check dams, grass-lined channels, permanent slope diversions, temporary slope diversion dikes)
   - sediment control (bush barriers, composite filter berms, composite filter socks, construction entrances, fiber rolls, filter berms, sediment basins and rock dams, and many more)
   - having a material management plan (concrete washout, general construction site waste management, spill prevention and control plan, vehicle maintenance and washing areas at construction sites)
5. **Implement a post-construction storm water management in new development and redevelopment**:
   - conducting inspections of best management practices of developed areas
   - establishing ordinances for post construction runoff
   - reviewing post construction plans
   - zoning
   - establishing alternative pavers
   - establishing alternative turnarounds
   - establishing conservation easements
   - establishing development districts
   - eliminating curbs and gutters
   - establishing green parking
   - establishing green roofs
   - conducting infrastructure planning
   - implementing low impact development and other green strategies

- narrower residential streets
- open space design
- protection of natural features
- redevelopment
- protection of natural features
- riparian/forested buffers
- street design and patterns
- urban forestry
- implementing infiltration practices (grassed swales, infiltration basin, infiltration trench, porous pavement)
- implementing filtration practices (bioretention rain gardens, catch basin inserts, sand and organic filters, and vegetated filter strips)
- establishing retention/detention areas (dry detention ponds, in line storage, on lot treatment, storm land wetland which is also known as a constructed wetland, and wet ponds)

6. **Prevent pollution during municipal operations**:
   - providing municipal employee training and education
   - establishing the proper municipal practices (municipal landscaping, municipal vehicle fueling, municipal vehicle and equipment maintenance and washing, parking lot and street cleaning, road salt application and storage, roadway and bridge maintenance, and storm drain cleaning)
   - storing hazardous materials properly
   - managing materials
   - managing municipal facilities
   - responding to and preventing spills

Other helpful resources include:

Storm Water Best Management Practices- This website provides access to an extensive database of storm water best management practices. This database helps water quality professionals to learn about successful best management practices and apply proven methods to local water quality projects.
www.bmpdatabase.org

Municipal Storm Water Toolbox for Maintenance Practices- This document provides quick and easy guidance to a municipal maintenance staff regarding ways to integrate water quality friendly practices into routine everyday activities.
www.oracwa.org/Pages/toolbox.htm

Water Environment Federation- This is a nonprofit technical and educational resource for those concerned with water quality. Provides access to workshops, training and a variety of technical information that would be useful to organizations operating water treatment facilities.
www.wef.org/home

Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat- This document provides guidelines for the siting, design, construction, operation, maintenance and monitoring of constructed treatment wetlands. It also contains updated information on EPA policies, permits, regulations and resources.
www.epa.gov/owow/wetlands/constructed/

Suggested Solution #3: Restore and Protect Natural Wetland Areas

A wetland is a liaison between the water and the land. Wetlands may be wet all year-round or wet only during the growing season, making their identification sometimes difficult. This important ecosystem is the meeting point of water flow, nutrient recycling and the sun's energy. This area

is characterized by a unique hydrology, soil, and vegetation. Wetlands are a critical part of any watershed. Some examples of wetlands are marshes, swamps, bogs, and fens.

Wetlands are not only useful from a wildlife standpoint. They are an integral part of our watershed. By directly protecting our drinking water from contaminants and preventing flooding, wetlands are recognized as a valuable resource worth protecting and utilizing. Unfortunately, in Ohio nearly 90% of the wetlands that existed in the eighteenth century have been lost (Sharon 2006). At the end of this document is a map showing the wetlands that remain in Stark County today (8 MB).

Flood Insurance

When rivers overflow, wetlands help to absorb and slow flood waters. These areas are called floodplains. A floodplain is the land adjacent to a body of water that can safely hold for a period of time until the water soaks into the earth or is dispersed downstream. The floodplains of Stark County are shown at the end of this document in a map taken from the SCRPC/SCATS 2030 Comprehensive/Transportation Plan (9 MB). Some of the flood plains are protected by easements, however more than half of the floodplains are not protected.

Purchasing and protecting floodplains will potentially save our county millions of dollars. A thorough investigation of the monetary value of wetlands in western Washington was conducted in 1997. This report provides excellent insight to other regions. The document can be viewed at http://www.ecy.wa.gov/biblio/97100.html. Anyone who builds on a floodplain must expect it to flood at some point and must expect the property damages along with it. Some people in the past have remedied the situation by importing sediment to the area. Filling in floodplains with dirt will only make the high water mark higher. This puts other property owners who built above the previous flood plain in danger of flooding. Purchasing and preserving active floodplains (wetlands) is an effective way to prevent many flooding events from occurring.

Ground Water Protection

After storm water is collected and slowed in a wetland, the water moves around the plants and the suspended pollutant carrying particles precipitate to the wetland floor. Certain pollutants, such as nutrients from fertilizer, manure, leaking septic tanks, and municipal sewer output, can be directly absorbed by the plants in the wetland. Other pollutants combine with soil particles in the wetland and are prevented from entering the ground water. Wetlands protect our groundwater from both point source pollution and non-point source pollution.

Restoring and Conserving Wetlands

Currently, only 13% of wetlands in the U.S. are owned by federal agencies (The White House Council on Environmental Quality 2006). The power to establish and protect wetlands lies in the hands of private landowners. The federal and state governments have set up programs to give landowners incentives to utilize these natural resources. Many of these programs supply both monetary and technical assistance.

- **North American Wetlands Conservation Act**: This Fish and Wildlife Service program promotes long term conservation of North American wetlands for the benefit of waterfowl and other migratory birds, fish, and wildlife. The Act offers a standard grant program that involves a private-public matching funds partnership on a wetland restoration or enhancement project.
    - www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm.
- **National Wildlife Refuge System**: Many wildlife refuges are restoring former wetlands. This group focuses on management purposes and wildlife goals that depend on healthy wetland habitats. Many wetlands require a great deal of maintenance such as seasonal flooding.
    - www.fws.gov/refuges.

- **Conservation Reserve Program (CRP)**: The country's largest private lands environmental improvement program, this USDA program restores wetlands with grass, trees and other long-term cover.
    - CRP is a voluntary cost-share program for private owners of agricultural lands. The Commodity Credit Corporation pays a yearly rent of acreage allocated for conservation practices for 10-15 years. They also pay 50% of the cost to implement conservation efforts.
    - Wildlife biologists from the Department of the Interior estimate that CRP efforts have resulted in a 30% increase in duck populations on CRP lands compared to croplands.
    - www.fsa.usda.gov/dafp/cepd/crp.htm.
- **Conservation Reserve Enhancement Program (CREP):** An offshoot of the CRP, the Conservation Reserve Enhancement Program is a voluntary land retirement program. The program is a partnership among federal, state, tribal, and private programs.
    - A sound financial package is provided for landowners who make 10 to 15 year commitments to remove land from agricultural production.
    - This program helps landowners to protect environmentally sensitive land, reduce soil erosion, restore wildlife habitat, and protect ground and surface water.
    - Some examples in Ohio:
        - In April 2002 a CREP was established to protect the Hoover Reservoir. The state and federal governments partnered to remove agricultural production from 3,500 acres in the Upper Big Walnut Creek Watershed that drains into the Hoover Reservoir. The program reimbursed landowners for planting acres of filter strips, riparian buffers, hardwood trees, and wetland habitats. This will prevent pollution from entering the watershed. The Hoover Reservoir is a large source of drinking water for Columbus.
        - In 2005, President Bush made 70,000 acres along the Scioto River eligible for the CREP. The Scioto Watershed provides drinking water for 2 million people. By January 2006, 42,000 acres were enrolled. Farmers will receive annual payments of $175-$200 per acre if they take crops out and replace them with native grasses, wetlands and other vegetation.
    - www.fsa.usda.gov/dafp/cepd/crep.htm.

- **EPA Five-Star Restoration Program**- provides grants and promotes information exchange through community based education and restoration projects
    - This program develops knowledge and skills in young people (especially "at risk kids") through restoration projects involving multiple and diverse partners such as elected officials, local governments, youth groups, schools, community groups and environmental agencies.
    - The Five Star Challenge Grant's objective is to connect 5 or more partners in each project to contribute funding, land, technical assistance, labor, or other in-kind assistance that matches the funding provided.
    - EPA contributes grants of 5,000-15,000 dollars
    - www.epa.gov/owow/wetlands/restore/5star/.

- **Wetlands Reserve Program (WRP)**
    - The USDA Natural Resources Conservation Service provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the

program. This program offers landowners an opportunity to establish long-term wildlife conservation practices and protection.
    - There are three programs: 10 year restoration cost-share agreements, 30 year conservation easements, and permanent easements.
    - Landowners retain control of non-developed recreational activities such as hunting and fishing. They also have the right to lease recreational uses for financial gain.
    - For more information go to www.nrcs.usda.gov/PROGRAMS/wrp.

- **Wetlands Reserve Enhancement Program (WREP):** A program that assists in the delivery of the WRP program by allowing the Natural Resource Conservation Service to form special partnerships with others to improve or expand the WRP.
    - For the 2006 fiscal year, the Natural Resource Conservation Service is making $ 9.5 million available in financial assistance to WREP partnership proposals.
    - www.nrcs.usda.gov/PROGRAMS/wrp.

- **Environmental Quality Incentive Program (EQIP):** This is a voluntary USDA conservation program for farmers to treat soil, air, water and related natural resource concerns on eligible land.
    - Incentive payments provide assistance to producers who adopt land management practices such as nutrient management, manure management, integrated pest management, irrigation water management, and wildlife habitat enhancement.
    - Contracts have a minimum commitment of one year and a maximum of 10 years.
    - Maximum cost-share plans are set at 75%; however, beginning farmers and limited resource producers may be eligible for a 90% cost-share.
    - www.nrcs.usda.gov/PROGRAMS/EQIP/.

- **Partners for Fish and Wildlife Program:** This program provides technical and financial assistance directly to private landowners and tribes who volunteer to help meet the habitat needs of fish and wildlife on their lands. This program has restored more than 750,000 acres of privately owned wetlands.
    - http://ecos.fws.gov/partners/viewContent.do?viewPage=home.

- **Wetland Conservation Private Organizations**:

    - ***Ducks Unlimited***- www.ducks.org
        - The largest wetland and waterfowl conservation organization. Since its establishment in 1937 this organization has raised 1.5 billion dollars and has conserved more than 11 million acres of habitat.
        - In Ohio- 71,473 acres have been conserved.
        - $806,780 was raised by Ducks Unlimited in 2005.
        - They establish and sponsor many projects such as Private Land Restoration, Wetland Restoration Programs, and the Northern Sandusky Watershed Wetland Restoration Program.
        - The district contact for Stark County is Bruce Byler (babyler33@aol.com).
    - ***Ohio Wetland Foundation***- www.ohiowetlands.org
        - A non-profit organization that provides high quality offsite wetlands mitigation alternatives in Ohio. Funds are used to acquire property, to design, construct, and maintain wetlands.

They also fund the construction of trails and interpretive signs at sites. Some funding is also allocated to research.

Purchase and Protect Active Floodplain Areas
Programs that help to purchase and manage floodplains:

- **Emergency Watershed Protection**- This program sponsors projects such as cleaning debris from clogged waterways, restoring vegetation and stabilizing riverbanks. It can also be used to purchase floodplain easements. The floodplains that are eligible are flood plains that have been recently impaired (in the last 12 months) or have a history of repeated flooding. Measures taken must be environmentally sound and must involve more than one property owner. www.nrcs.usda.gov/Programs/ewp.
- **Ohio Floodplain Management Handbook**- This handbook provides floodplain managers with updated information on the science of flooding, floodplain mapping, regulations, administrative procedures, flood insurance, etc. This handbook can be used to assist floodplain managers and community officials. To down load a pdf of the handbook go to www.dnr.state.oh.us/water/floodpln/fphandbook.htm.

Protecting Wetlands
Although wetlands absorb excess pollutants and nutrients in run off water, they do have a breaking point.

- **Regulatory Action**
  - EPA has established standards for reviewing permits for discharges that effect wetlands including roads, residential developments and levees.
  - Section 404 of the Clean Water Act issues permits that meet environmental standards.
  - For information about wetland regulations, legislation, and policy in regards to Section 401 and Section 404 of the Clean Water Act go to Wetlands Regulation Center Website at http://www.wetlands.com
  - For any additional questions about wetland regulations, legislation, and policy in regards to Section 404 of the Clean Water Act please contact **The Wetland Helpline** toll-free at (800)832-7828 or email wetlands.helpline@epa.gov. To make a request online, go to http://www.epa.gov/OWOW/wetlands/wetline.html

- **Implement Best Management Practices**
  - As previously mentioned, there are a myriad of best management practices that will reduce the amount of pollution wetlands receive via storm water runoff. These practices are especially useful in densely populated areas with many impervious surfaces.
  - Protecting Natural Wetlands: A Guide to Storm Water Best Management Practices- This is an excellent guide on best management practices that specifically target wetland protection. You can view a pdf version of the guide at http://www.epa.gov/owow/wetlands/pdf/protecti.pdf.
  - One specific non structural best management practice that should be emphasized is restoring and protecting the riparian corridor.
    - Land adjacent to streams, rivers, and lakes is called the riparian corridor or riparian zone. A riparian buffer is an area of vegetative land that serves as a transitional zone between water and land use. Restoring the riparian corridor will protect our water supply from sediments, agricultural runoff, pollutants from developing areas, and storm water runoff. Riparian areas correspond very well with active

floodplains. A riparian buffer is also vital in protecting wetlands from reaching their breaking point in their ability to filter out pollutants.

- Protecting riparian areas:
  - Define the buffer strip width
  - Establish a legal easement
  - Educate riparian land owners
  - Establish construction setbacks
  - Establish ordinances to protect watersheds
- Restoring riparian areas:
  - Allow natural regeneration: create a preservation area or "no-mow" zone
  - Transport woody plants to riparian areas

- **Regular Wetland Monitoring**
  - EPA works with states, tribes, local government and citizens, to monitor, protect and restore wetlands.
  - Monitoring is key in determining the effectiveness of best management practices.
  - Wetland monitoring tool: Methods for Evaluating Wetland Condition. This booklet contains the most advanced methods for monitoring and assessing the biological and nutrient conditions of a particular wetland in order to determine its health. To view this document go to: www.epa.gov/waterscience/criteria/wetlands/.

- **Grant Research tool:** Catalog of Federal Funding Sources for Watershed Protection- This website is a searchable catalog of various watershed related funding programs.

Suggested Solution #4: Continued Watershed Monitoring

The only way to gauge if management efforts have generated any results is to set up a continuous monitoring program. NEFCO suggests in their Nimishillen Watershed Action Plan to continue and expand their macro invertebrate and habitat monitoring station at the West Branch basin in Stark County (Akin 2006).

Some tools and websites that are useful to watershed monitors are:

- Sample Size and Sampling Frequency Estimator- a free program from the EPA that helps determine sample sizes required for water quality monitoring objectives. To download go to www.epa.gov/earth1r6/6wq/ecopro/watershd/monitrng/qappsprt/sampling.htm.

- Stream Visual Assessment Protocol- This document provides a procedure to evaluate the condition of a stream based on visual characteristics. To view this document go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/svapfnl.pdf.

- National Handbook of Water Quality Monitoring- This handbook contains information on how to design a monitoring system by observing chemical changes in water quality associated with agricultural nonpoint source controls. To view this handbook go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/wqm1.pdf. To view part two (a draft version) of this handbook go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/nwqh615.pdf.

- Monitoring and Assessment Water Quality – This website provides links to various tools and helpful documents in regards to monitoring water quality. To view this website go to http://www.epa.gov/owow/monitoring/.

Water Quality Issue: Agricultural Runoff

The *2000 National Water Quality Inventory* reported that agricultural runoff is the leading source of water quality impacts on surveyed rivers and lakes, and the second leading source of contamination to wetlands (Environmental Protection Agency 2005). Some agricultural activities that may cause water impairment are poorly located or managed animal feeding operations, overgrazing, plowing too often or at the wrong time, and improper, excessive, or poorly timed application of pesticides and fertilizers. Runoff from poorly managed agricultural operations often contains sediment, nutrients, pathogens, pesticides, metals, and salts.

Suggested Solution #1: Educate Agricultural Operators and Landowners on Best Management Practices

The Stark County Soil and Water Conservation District is an organization working to complete this task. They are working with farmers on implementing best management practices. To view the Stark County Soil and Water Conservation District go to www.starkswcd.org.

The Wayne County Soil and Water Conservation District has good website Stark County farmers could utilize to their benefit. This site has a variety of information including a rural landowner assistance page that gives examples and pictures of agricultural best management practices. To view the Wayne County Soil and Water Conservation District website see www.bright.net/~swcd/. To view the rural landowner assistance page go to www.bright.net/~swcd/rural.html.

Suggested Solution #2: Implement Best Management Practices

The event of glaciers arriving and stopping in Stark County has forever changed the landscape and thus changed the land use of the county. The contrasting landscapes of the glaciated versus the unglaciated (southeastern) parts of the county have led to a diversity of farming activities. The farms in the glaciated part of the county are predominately agricultural and the southeastern part of the county generally cultivates livestock. Planning committees need to provide information on a variety best management practices to our farmers.

- **Best Management Practices of Animal Feeding Operations**

Animal Waste Management- This website provides software programs as well as various documents that provide information and guidance on animal waste treatments. To view this website go to www.wcc.nrcs.usda.gov/awm/. One particularly helpful software program to note is the USDA Animal Waste Management Software. This software is a tool for estimating the waste production within a specific animal feeding operation. This program then determines the size of the storage/treatment facilities needed to effectively manage the operation. For more information go to www.wcc.nrcs.usda.gov/awm/awm.html.

National Agricultural Compliance Assistance Center- Animal Feeding Operations (AFO) Website- This website provides many links to both animal feeding operations and agricultural best management practices. To view this website go to www.epa.gov/npdes/afovirtualcenter.

- **Best Management Practices to Control Nutrient Output**

Nutrient Management- This website provides tools and documents that are helpful in controlling nitrogen and phosphorous output. To view this website go to www.wcc.nrcs.usda.gov/nutrient/.

- **Best Management Practices to Mitigate Pest Control**

Pest Management- The Natural Resource Conservation Service also offers software and documents that guide people on reducing environmental risks due to pest control measures. To view this document go to www.wcc.nrcs.usda.gov/pestmgt/PMPolicy.html.

Pesticide Tools:

- Windows Pesticide Screening Tool (WIN-PST) - A simple pesticide screening tool that evaluates the potential environmental risk for pesticide to move with water and eroded soil or organic matter and affect non-targeted organisms. To download this tool go to www.wcc.nrcs.usda.gov/pestmgt/winpst.html.

- National Agricultural Pesticide Risk Analysis (NAPRA) - This is a complex modeling system that predicts the probability of toxic pesticide movement associated with certain crop management techniques under certain soil and weather conditions. To download this program go to www.wcc.nrcs.usda.gov/pestmgt/napra.html.

- **Comprehensive Agricultural Best Management Resources**

National Management Measures to Control Nonpoint Source Pollution from Agriculture- This is a technical guidance and reference document to be used to implement nonpoint source management programs. It contains the best available, economically achievable means of reducing pollution by agricultural operations. To download a pdf document of this guide go to www.epa.gov/owow/nps/agmm/index.html.

National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution- This downloadable pdf guidance document describes practices that reduce nonpoint source pollution. To download a copy of this EPA document go to www.epa.gov/owow/nps/wetmeasures/.

Best Nonpoint Source Documents- The EPA has put together a website that contains links to what they feel are exceptional nonpoint source pollution documents and websites. To access these sites go to www.epa.gov/owow/nps/bestnpsdocs.html.

Best Management Practices Web Page- This site is managed by Ohio State University. It provides links to technical and economical information on best management practices used in Ohio. To view go to www.aede.osu.edu/people/sohngen.1/bmp/bmpinfo.htm.

Information for Farmers, Ranchers, and other Agricultural Producers- This websites provides access to a variety of Best Management Practices researched by the USDA. To view this website go to www.nrcs.usda.gov/partners/for_farmers.html.

Section 319 Success Stories- This website gives examples of how other areas implemented best management practices and what results came about from their efforts. To view these examples go to www.epa.gov/owow/nps/Success319.

The Natural Resources Conservation Service Photo Gallery- NRCS has about 1,500 conservation related images that can be downloaded from this site. For more information go to http://photogallery.nrcs.usda.gov/.

Suggested Solution #3: Obtain Funding for Agricultural Management Operations that Protect and Restore our Watershed (especially Wetlands)

The storm water runoff section discusses how effective functioning wetlands are in pollution control. Wetlands act as a buffer between bodies of water and upland areas. They naturally filter out nutrients and pathogens that are a result of agricultural runoff. However, they do eventually have a breaking point. The best way to manage nonpoint source pollution and to protect our valuable wetlands is by managing an entire watershed. Implementing practices to reduce agricultural runoff costs money. The control of nonpoint source pollution is mostly voluntary, so

the government has set up funding to give farmers incentives to protect our drinking waters. There are many programs set up to restore and protect wetlands. This section discusses specific grants and cost-share incentives available to farmers.

Grants and funding available to agricultural and animal operations:

- **Clean Water Act Section 319 Funding:** Section 319 of the Clean Water Act addresses the need for federal leadership in the control if nonpoint source pollution. This act conducts measures that are voluntary by providing states with funding. This funding is available to designated state and tribal agencies to implement approved nonpoint source management practices.
    - For more information go to: http://www.epa.gov/nps/319hfunds.html
- **Conservation Reserve Program (CRP):** The country's largest private lands environmental improvement program, this USDA program restores wetlands with grass, trees and other long-term cover.
    - CRP is a voluntary cost-share program for private owners of agricultural lands. The Commodity Credit Corporation pays a yearly rent of acreage allocated for conservation practices for 10-15 years. They also pay 50% of the cost to implement conservation efforts.
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    - Some examples in Ohio:
        - In April 2002, a CREP was established to protect the Hoover Reservoir located near Columbus. The state and federal governments partnered up to remove agricultural production from 3,500 acres in the Upper Big Walnut Creek Watershed that drains into the Hoover Reservoir. The program reimbursed landowners for planting acres of filter strips, riparian buffers, hardwood trees, and wetland habitats. This will prevent pollution from entering the watershed. The Hoover Reservoir is a large drinking water source for Columbus.
        - In 2005, President Bush made 70,000 acres along the Scioto River eligible for the CREP. By January 2006, 42,000 acres were enrolled. Farmers will receive annual payments of $175-$200 per acre if they take crops out and replace them with native grasses, wetlands and other vegetation. The Scioto Watershed provides drinking water for 2 million people. For more information about the CREP go to www.fsa.usda.gov/dafp/cepd/crep.htm.
- **Wetlands Reserve Program (WRP):** The USDA Natural Resources Conservation Service provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.
    - There are three programs: 10 year restoration cast-share agreements, 30 year conservation easements, and permanent easements

- Landowners retain control of non-developed recreational activities such as hunting and fishing. They also have the right to lease recreational uses for financial gain
- For more information go to www.nrcs.usda.gov/PROGRAMS/wrp.

- **Wetlands Reserve Enhancement Program (WREP):** A program that assists in the delivery of the WRP program by allowing the Natural Resource Conservation Service to form special partnerships with others to improve or expand the WRP.
  - For the fiscal year of 2006 the Natural Resource Conservation Service is making $ 9.5 million available in financial assistance to WREP partnership proposals.
  - For more information go to www.nrcs.usda.gov/PROGRAMS/wrp.

- **Environmental Quality Incentive Program (EQIP):** a voluntary USDA conservation program for farmers to treat soil, air, water and related natural resource concerns on eligible land.

  - Incentive payments provide assistance to producers who adopt land management practices such as nutrient management, manure management, integrated pest management, irrigation water management, and wildlife habitat enhancement.

  - Contracts have a minimum commitment of one year and a maximum of 10 years.
  - Maximum cost-share plans are set at 75%, however, beginning farmers and limited resource producers may be eligible for a 90% cost-share.
  - For more information go to www.nrcs.usda.gov/PROGRAMS/EQIP/.

- **Farm *A* Syst:** This is a partnership between government agencies and private businesses that enables them to prevent pollution on farms, ranches, and homes using confidential environmental assessments.

  - To view this partnership's website go to www.uwex.edu/farmasyst/.

- **Research and Reference Tools:**

  - Agricultural Nonpoint Source Pollution Management Website- This website contains links to helpful documents, federal programs, partnerships, and nongovernmental organizations that convey advice and assistance to farmers and ranchers for protecting water quality. To view this website go to: http://www.epa.gov/nps/agriculture.html.

  - Agricultural Management Assistance Database- This program provides cost share assistance to agricultural producers who voluntarily practice conservation in their agricultural operations. For information go to: http://www.nrcs.usda.gov/programs/ama.

  - Searchable Catalog of Federal Funding Sources For Watershed Protection- To view this catalog go to http://www.epa.gov/watershedfunding.

Suggested Solution #5: Monitor Effectiveness of Agricultural Best Management Practices

As stated in other sections, part of implementing the best management practices is monitoring their effectiveness. Good water quality data helps to determine if the technique is working or if more efforts need to be implemented.

Some helpful tools to accomplish this are:

- Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures- This document focuses solely on monitoring agricultural best management practices. For more information go to www.epa.gov/owow/nps/agfinal.html.

- National Management Measures to Control Nonpoint Source Pollution From Agriculture- The following link is to the water quality monitoring section of the handbook. To view this section go to www.epa.gov/owow/nps/agmm/chap6.pdf.

- Sample Size and Sampling Frequency Estimator- This is a free program from the EPA that helps to determine the sample sizes required to support water quality monitoring objectives. To download this program go to www.epa.gov/earth1r6/6wq/ecopro/watershd/monitrng/qappsprt/sampling.htm.

- A Procedure to Estimate the Response of Aquatic Systems to Change in Phosphorous and Nitrogen Inputs- the USDA provides a pdf version of a simple tool to estimate a water body's sensitivity to nutrients. To view this document go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/aqusens.pdf**.**

- Stream Visual Assessment Protocol- This document provides a procedure to evaluate the condition of a stream based on visual characteristics. To view this document go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/svapfnl.pdf.

- National Handbook of Water Quality Monitoring- This handbook contains information on how to design a monitoring system by observing chemical changes in water quality associated with agricultural nonpoint source controls. To view this handbook go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/wqm1.pdf. To view of part two (a draft version) of this handbook go to ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/nwqh615.pdf.

- Monitoring and Assessment Water Quality – This website provides links to various tools and helpful documents in regards to monitoring water quality. To view this website go to http://www.epa.gov/owow/monitoring/

Water Quality Issue: Failing Home Sewage Treatment Systems

Home sewage treatment systems, also known as septic tanks, are very prevalent throughout Stark County. If not properly maintained, septic systems often malfunction or overflow. When this happens, bacteria, pathogens, and nutrients are released into the watershed contaminating the ground water.

The Nimishillen Watershed Action Plan has an entire section devoted to addressing failing home sewage treatment systems. This section discusses how to accomplish these solutions in detail. For more information go to: http://www.uptuscwatershed.org/nim_state_action_plan.htm.

Suggested Solution #1: Educate the Public about the Effects of Failing Home Sewage Treatment Systems on Groundwater.

Before an outreach program can be implemented, information on where septic systems are being utilized needs to be determined. This Stark County Health Department may provide this information. They could also provide target areas with septic systems that are in critical condition. Some helpful outreach resources are listed below.

- Materials to educate the public, industry, and septic customers – The EPA has provided information on developing a public outreach program, graphics to help create your own materials, and publications to help maintain septic systems. To view this page go to http://cfpub.epa.gov/owm/septic/educating.cfm.
- A Homeowner's Guide to Septic Systems- This guide informs homeowners on important septic system issues such as maintenance, responsibilities, causes of failures, etc. To view a Spanish version of this guide go to www.epa.gov/owm/septic/pubs/xguiadeldueno06-06.pdf.
- Homeowner's Septic System Checklist- This worksheet allows homeowners to keep track of the inspections and maintenance of their septic systems. To download a copy of this checklist go to www.epa.gov/owm/septic/pubs/septic_sticker_custimize.pdf.
- Technology Information- the EPA also provides a website with fact sheets on various technologies that can be applied to septic systems. The EPA has 12 testing centers that evaluate the performances of such environmental technologies. To view this website go to http://cfpub.epa.gov/own/septic/technology.cfm.

Suggested Solution #2: Establish a Regional Home Sewage Treatment System Management Program

Implementing a regional program is the most efficient way to manage home sewage treatment systems. Local officials have access to many **free** and useful resources found on the Internet that will aid in developing and carrying out a regional program.

- Management Handbook for Septic/Decentralized Systems- This guide provides a step-by-step approach for developing a community management program for decentralized waste waters treatment systems. To download a copy of this manual go to http://cfpub.epa.gov/owm/septic/guidelines.cfm#handbook. This website also contains other guides on this subject.

- The Waste Water Information Tool (TWIST) - This tool is a user-friendly management tool that will allow state and local health departments to effectively inventory and manage small wastewater treatment systems in their jurisdictions. To order a free copy call 1-800-490-9198 or 513-489-8190. You can also email ncepimal@one.net. For more details on this tool visit http://cfpub.epa.gov/owm/septic/twist.cfm.

- Ohio State University Soil Environment Technology Learning Lab- This lab offers training to local officials in issues regarding managing septic systems. To view the lab's website go to http://setll.osu.edu.

Suggested Solution #3: Establish Funding for Homeowners to Repair Failed Systems

Many home sewage treatment systems are located in low income areas. These people need assistance in maintaining and upgrading their septic tanks. The following website contains many funding options.

- Septic System Funding Sources- This website offers links to federal funding sources, tribal funding sources, and funding for technical assistance. To view this website go to *http://cfpub.epa.gov/owm/septic/linkresult.cfm?link_category=12&view=link*.

Suggested Solution #4: Continue to Monitor the effects of Home Sewage Treatment Systems on the Surrounding Watershed

Monitoring our watershed is the best way to prevent contamination and to target the critical areas. A helpful guide to monitor the progress of management efforts is listed below.

- Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures Urban- This document gives guidance on how to monitor the progress of best management practices of urban and suburban areas. Dealing with failed septic tanks is part of this guidance document. It even mentions the monitoring program of the Allen County Health Department of Ohio as an example. To view this document go to www.epa.gov/owow/nps/urban.pdf.
- Monitoring and Assessment Water Quality – This website provides links to various tools and helpful documents in regards to monitoring water quality. To view this website go to http://www.epa.gov/owow/monitoring/

Water Quality Issue: Acid Mine Drainage

An economic activity in Ohio's past and present is coal mining. The southern unglaciated portion of Stark County is speckled with abandoned coal mines that may pose a threat to our watershed. There is a map at the end of this document of abandoned mines in Stark County (3 MB).

Acid mine drainage comes from both abandoned and active mines. When water flows over or through sulfur bearing materials, water is converted into a very acidic runoff called acid mine drainage. Mine drainage is formed when pyrite, an iron sulfide, is exposed and reacts with air and water to form sulfuric acid and dissolved iron. The acid runoff then further dissolves heavy metals such as copper, lead, and mercury into the ground or surface water (Sweeney 2006). Acid mine drainage causes the contamination of drinking water, the degradation of aquatic life and will corrode parts of infrastructures such as bridges.

Suggested Solution #1: Implement Best Management Practices to Abandoned Mines Emitting Runoff

There are two classes of practices used to manage acid mine drainage- active and passive.

Active practices consist of treating the runoff with chemicals such as limestone, hydrated lime, soda ash, caustic soda, and ammonia. These chemical treatments have a list of pros and cons amongst each other. A more detailed description of the effects and results of using such chemicals to treat acid mine drainage can be found at www.epa.gov/region3/acidification/treatment.htm.

Passive practices involve breaking down acid runoff via natural biological and chemical practices. Passive practices are low tech and require little maintenance. Examples of passive best management practices to treat acid mine runoff are constructed wetlands, open limestone channels, anoxic limestone drains, and diversion wells. You can view a detailed description of these practices by visiting www.epa.gov/region3/acidification/treatment.htm.

Helpful websites in regards to treatment of acid drainage:

- The Science of Acid Mine Drainage and Passive Treatment- This document was authored by the Pennsylvania EPA. It gives a detailed description of the passive methods used to manage acid mine drainage. This document can be viewed at www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science_of_AMD.htm.

- Acid Mine Drainage Technology Initiative- This is a handbook of technology for avoidance and remediation of acid mine drainage. To view this handbook go to wwwri.nrcce.wvu.edu/programs/adti/publications/adti_handbook.html.

- Acid Mine Treatment Techniques and Costs- This document is sponsored by the office of surface mining. It gives decision makers a rough estimate of how much both active and passive treatments cost. For more information go to www.osmre.gov/amdtcst.htm.

- Acid Mine Drainage Treatment- This website is very useful in that it has many documents and other links in regards to the treatment of acid mine drainage. To view these links go to www.wvu.edu/~agexten/landrec/land.htm.

- A Science-Based Watershed Strategy to Support Effective Remediation of Abandoned Mine Lands- The U.S. Geological Survey Abandoned Mine Initiative has put together a document discussing cost effective ways to manage acid mine drainage using a watershed approach. To view this document go to: amli.usgs.gov/reports/icard97/icard97.html.

- Section 319 Success Stories- This website gives examples of how other areas implemented best management practices and what results came about from their efforts. Some good places that implemented such practices to treat acid mine drainage are Mosquito Creek Watershed, CO and Cheat River Watershed, WV. To view these examples go to: www.epa.gov/owow/nps/Success319.

Funding Sources for Treatment of Acid Mine Drainage:

- **Abandoned Mine Land Program**- This program provides money to reclaim and restore land that has been adversely been affected by mining. To get information on this program go to: www.osmre.gov/aml/intro/zintro2.htm.

- **Rural Abandoned Mine Program**- This program provides technical and financial assistance to land users who voluntarily enter into a 5 to 10 year contract for reclamation of eligible abandoned mine lands and waters. For information on this program go to: www.nrcs.usda.gov/programs/ramp/.

- **Clean Stream Initiative**- This program involves citizens, industries, and the government to eliminate acid mine drainage. For more information go to: www.osmre.gov/acsihome.htm.

- **Clean Water Act Section 319 Funding-** Section 319 of the Clean Water Act addresses the need for federal leadership in the control of nonpoint source pollution. Funding is available to designated state and tribal agencies to implement approved nonpoint source management practices. For more information go to: www.epa.gov/nps/319hfunds.html.

Suggested Solution #2: Investigate abandoned mines and determine if they contribute acidic runoff into the watershed

This solution was suggested by NEFCO in the Nimishillen Watershed Action Plan (2006). In Stark County we have many abandoned mines that have not been investigated, leaving their effluences a mystery. We need to pinpoint the contributing mines before we can take action to stop the pollution. More details on how, who and where to get funding to do this can be found in the Sherrick Run Subwatershed section and the Nimishillen Mainstream Subwatershed section in the Nimishillen Watershed Action Plan. The Sherrick Run plan can be viewed at: ***www.uptuscwatershed.org/nimishillen_creek/reports/state_action_plan/sherrick_run.pdf.*** The Mainstream Subwatershed Plan can be viewed at: ***www.uptuscwatershed.org/nimishillen_creek/reports/state_action_plan/mainstem.pdf.***

Suggested Solution #3: Establish long-term chemical and biological monitoring for areas that emit acid mine drainage

This solution was also suggested by NEFCO in the Nimishillen Watershed Coordinator Action Plan (2006). The only way to gauge any progress is by consistent monitoring of affected areas. Some parties that could possibly conduct the monitoring could be NEFCO or the Stark County Health Department.

Helpful Website:

- Monitoring and Assessment Water Quality – This website provides links to various tools and helpful documents in regards to monitoring water quality. To view this website go to http://www.epa.gov/owow/monitoring/

Water Quality Issue: Pollution Sources in the Future

As time marches on our county is constantly changing. People are moving further out into the suburbs, businesses are coming and going, and our airport is rapidly expanding. Smart and efficient planning is very crucial in growing communities. Smart planning will also save our county a lot of money in the future.

Stark County itself is a very diverse county as far as landscape and land use. Therefore we need to utilize many resources when making decisions about the future of our county.

Suggested Solution #1: Implement County-Wide Planning

Efforts made on a regional level will have a greater impact. Below are some free ways to use technology in order to make informed decisions.

Tools for County-Wide Planning:

- Long-Term Hydrologic Impact Assessment (L-THIA) - An accessible online tool to assess the water quality impacts of land use change. The creators of this tool offer a link to their other planning tools such as:
  - an automatic watershed delineation tool
  - a wellhead protection area tool
  - pesticide watershed tracking tool
  - an urban best management tool
  - a sediment, runoff, and erosion control tool
  - To view go to www.ecn.purdue.edu/runoff/lthianew/Index.html.
- Basins 3.0- The Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) software system is a multipurpose environmental analysis tool for use by regional, state, and local agencies performing watershed and water quality based studies. This tool integrates environmental data, analytical tools, and modeling programs to support cost-effective approaches to environmental protection. To download this software go to www.epa.gov/waterscience/basins/b3webdwn.htm.
- Smart Growth Policy Database- This database highlights many policies and programs that states and localities nationwide have implemented to further smart growth. This database provides everything from informal programs to legislative and regulatory efforts. To use this database go to http://cfpub.epa.gov/sgpdb/sgdb.cfm.
- Financial Impacts of Smart Growth- This guide provides planners and citizens the tools they need to examine the impacts of development proposals on local taxes and municipal budgets. For more information go to www.nrdc.org/cities/smartgrowth/dd/ddinx.asp.
- Sustainable Building Technical Manual- This manual covers all aspects of a sustainable building project. It shows you how to design, operate and maintain environmentally friendly buildings. To download a copy of the manual go to www.freshstart.ncat.org/articles/ptipub.htm.
- Green Communities Assistance Kit- This assistance kit contains a guide for communities that need help planning and implementing actions that reflect smart planning. This involves a five-step planning and implementation process to help communities achieve their goals. Each step includes tools, case studies, and frequently asked question sections. To view this toolkit go to www.epa.gov/greenkit/.

Tools for Rural Planning:

- Environmental Planning for Small Communities- This software program offers an introduction to a wide range of environmental issues and decisions that affect small to medium communities. You can download at www.epa.gov/seahome/trilogy.html.

- Security and Emergency Response Planning Toolbox for Small Water and Wastewater System- Helps small water and wastewater systems improve their security and prepare for disasters. For more information go to www.rcap.org/toolbox/index.html.

Tools for Urban Planning:

- CMOM Checklist- The Capacity, Management, Operations, and Maintenance (CMOM) Program Self Assessment Checklist. This is a screening level tool that can help utilities (sanitary sewer systems) identify general areas of strengths and weaknesses. To view this program go to www.lgean.org/documents/cmomchecklist.pdf.
- City Green 5.0- This program provides an urban forest ecosystem analysis. This program investigates large areas such as watersheds. It uses data derived from satellite imagery to allow cities and construction groups to calculate the economic and environmental benefits that trees provide in urban areas. In most areas, cities save millions of dollars with better tree cover planning. To view this program go to www.americanforests.org/productsandpubs/citygreen/.

Suggested Solution #2: Educate Residents about Water Quality Related Issues

Public participation is crucial when trying to manage a watershed. The best way to entice participation is by educating the public on what a watershed is and how daily activities impact it. In NEFCO's 2006 Nimishillen Creek Watershed- State Action Plan, Akin offers many strategies on how to go about educating the public. These strategies are:

- Educate residents about watershed issues through regularly scheduled events and activities that are recognized by the public (watershed surveys, presentations at local meetings, information booths at local fairs, creek clean-ups).
- Identify shoreline and riparian landowners and educate them about the importance of shoreline or riparian zone protection.
- Educate riparian landowners on stewardship including the removal of downed trees in the creek.
- Distribute flyers informing watershed residents on how to identify suspicious activities and who to contact to report illegal activities.
- Implement a watershed protection and awareness program in local schools.
- Educate owners and operators of industrial facilities about the benefits of implementing preventative and control measures to reduce pollutants.

Educational and Training Tools:

- Water Environment Federation- This is a nonprofit technical and educational resource for those concerned with water quality. Provides access to workshops, training and a variety of technical information that would be useful to organizations operating water treatment facilities. To view this website go to www.wef.org/home.

- ICMA Source Water Awareness Media Toolkit- This is a community awareness program that includes:
  - A Camera-ready Logo
  - Source Water Protection: Plain and Simple
  - Informational Flyer
  - Home Owner/Farmer Checklist
  - Q&A Fact Sheets
  - Sample Posters, Radio Announcements, News Releases, Questionnaire

  To view this toolkit go to: www.lgean.org/html/_tooldetail.cfm?id=43.

- Educating the Public How to Develop a Public Outreach Program
  http://cfpub.epa.gov/owm/septic/educating.cfm

- Water Quality Education and Outreach
  http://www.epa.gov/owow/monitoring/volunteer/monitoringmonth.html

Funding Sources:

- Ohio Environmental Education Fund http://www.epa.state.oh.us/oeef.

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